

## CLAIMS

The invention claimed is:

1. A carrier virtual network inverse multiplexed system comprising:

a first telecommunication network, the first telecommunication network having a plurality of layer one resources;

a second telecommunication network, the second telecommunication network having a plurality of layer one resources;

a portion of the layer one resources of the second telecommunication network dedicated to a first carrier virtual network;

a first network connection linking the first telecommunication network to the portion of the layer one resources of the second telecommunication network dedicated to the first carrier virtual network; and

an aggregate link that establishes a telecommunication connection to a termination point, the aggregate link comprising:

a first link from the first carrier virtual network;

a second link from the first carrier virtual network;

a carrier virtual network manager that aggregates the first link and the second link; and

an aggregator that aggregates the termination of the first link and the second link at their termination.

2. The carrier virtual network inverse multiplexed system of claim 1, further comprising:

a third telecommunication network, the third telecommunication network having a plurality of layer one resources;

a portion of the layer one resources of the third telecommunication network dedicated to the first carrier virtual network; and

a second network connection linking the first telecommunication network to the portion of the layer one resources of the third telecommunication network dedicated to the first carrier virtual network.

3. The carrier virtual network inverse multiplexed system of claim 2, wherein:

the first link from the carrier virtual network comprises a link from the portion of the layer one resources of the second telecommunication network dedicated to the first carrier virtual network; and

the second link from the carrier virtual network comprises a link from the portion of the layer one resources of the third telecommunication network dedicated to the first carrier virtual network.

4. The carrier virtual network inverse multiplexed system of claim 1, wherein the aggregate link further comprises:

at least one alternative link from the first carrier virtual network, the alternative link to be used in the aggregate link if the carrier virtual network manager determines that a link in the aggregate link is impaired.

5. The carrier virtual network inverse multiplexed system of claim 3, further comprising:

at least one alternative link from the first carrier virtual network, the alternative link to be used in the aggregate link if the carrier virtual network manager determines that a link in the aggregate link is impaired.

6. The carrier virtual network inverse multiplexed system of claim 2, further comprising:

a fourth telecommunication network, the fourth telecommunication network having a plurality of layer one resources;

a portion of the layer one resources of the fourth telecommunication network dedicated to a second carrier virtual network; and

a third network connection linking the first telecommunication network to the portion of the layer one resources of the fourth telecommunication network dedicated to the second carrier virtual network; and

wherein: the aggregate link further comprises:

a third link from the second carrier network;

a carrier virtual network manager that aggregates the first link, the second link, and the third link; and

an aggregator that aggregates the termination of the first link, the second link, and the third link.

7. A carrier virtual network inverse multiplexed system comprising:

a first telecommunication network;

a first carrier virtual network, the first carrier virtual network comprising at least one portion of layer one resources of at least one additional telecommunication

network, the layer one resources of the first carrier virtual network being accessible to the first telecommunication network;

at least one network connection linking the first telecommunication network to the at least one portion of layer one resources of the at least one additional telecommunication network;

a plurality of links from the first carrier virtual network;

a carrier virtual network manager that aggregates the plurality of links from the first carrier virtual network; and

an aggregator to aggregate the termination of the plurality of links from the first carrier virtual network.

8. The carrier virtual network inverse multiplexed system of claim 7, further comprising:

a plurality of alternative links from the first carrier virtual network, at least one of the plurality alternative links to be aggregated by the carrier virtual network manager if one of the plurality of links becomes impaired.

9. The carrier virtual network inverse multiplexed system of claim 7, wherein the plurality of links comprise different media.

10. The carrier virtual network inverse multiplexed system of claim 7, wherein at least one of the plurality of links comprises an E1 copper link.

11. The carrier virtual network inverse multiplexed system of claim 10, wherein at least one of the plurality of links further comprises a wireless link.

12. The carrier virtual network inverse multiplexed system of claim 10, wherein the plurality of links further comprises a coaxial link.

13. The carrier virtual network inverse multiplexed system of claim 10, wherein at least one of the plurality of links further comprises an FSO link.

14. The carrier virtual network inverse multiplexed system of claim 7, further comprising:

at least one high bandwidth connection output from the aggregator.

15. A method for establishing a carrier virtual network inverse multiplexed system to meet service level requirements, the method comprising:

establishing a first carrier virtual network that may be accessed by a first telecommunication network, establishing the first carrier virtual network comprising:

dedicating at least one portion of the layer one resources of at least one telecommunication network to the first carrier virtual network;

establishing a carrier virtual network manager to manage the at least one portion of the layer one resources dedicated to the carrier virtual network;

identifying the at least one portion of the layer one resources dedicated to the carrier virtual network to the carrier virtual network manager; and

accessing at least two layer one resources of the at least one portion of the layer one resources dedicated to the first carrier virtual network by at least one telecommunication network;

identifying a plurality of links in the first carrier virtual network that combine to meet service level requirements;

provisioning the plurality of links;

aggregating the identified plurality of links using the carrier virtual network manager; and

aggregating the identified links at their termination.

16. The method for establishing a carrier virtual network inverse multiplexed system of claim 15, the method further comprising:

identifying a plurality of alternative links for use if any of the identified links become impaired; and

aggregating at least one of the alternative links at the termination and the carrier virtual network manager if any of the identified links become impaired so that the aggregated links continue to meet the service level requirements.

17. The method for establishing a carrier virtual network inverse multiplexed system of claim 16, wherein aggregating at least one of the alternative links at the termination and the carrier virtual network manager if any of the identified links become impaired comprises:

receiving an impairment alert at the carrier virtual network manager

identifying the impairment of one of the aggregated links;

provisioning at least one alternative link to replace the impaired link;

re-aggregating the at least one alternative link with the non-impaired identified links at the termination; and

re-aggregating the at least one alternative link with the non-impaired identified links using the carrier virtual network manager.

18. The method for establishing a carrier virtual network inverse multiplexed system of claim 15, further comprising:

identifying a plurality of alternative links for use if any of the identified links become impaired;

receiving an impairment alert at the carrier virtual network manager  
identifying the impairment of one of the aggregated links;

provisioning at least one alternative link to replace the impaired link;

re-aggregating the at least one alternative link with the non-impaired identified links at the termination; and

re-aggregating the at least one alternative link with the non-impaired identified links using the carrier virtual network manager.

19. The method for establishing a carrier virtual network inverse multiplexed system of claim 15, further comprising:

receiving an impairment alert at the carrier virtual network manager  
identifying the impairment of one of the aggregated links;

identifying a second plurality of links in the first carrier network that combine to meet service level requirements, the second plurality of links not containing the impaired link;

provisioning the second plurality of links;

aggregating the second plurality of links using the carrier virtual network manager; and

aggregating the second plurality of links at the termination.

20. The method for establishing a carrier virtual network inverse multiplexed system of claim 19 wherein identifying a second plurality of links occurs before receiving an impairment alert.

21. The method for establishing a carrier virtual network inverse multiplexed system of claim 19 wherein identifying a second plurality of links occurs after receiving an impairment alert.

22. A method for establishing an inverse multiplexed connection to meet service level requirements using a plurality of links dedicated to at least one carrier virtual network accessible to an accessing telecommunication network, the method comprising:

identifying a first plurality of links dedicated to a carrier virtual network accessible to the accessing telecommunication network that combine to meet service level requirements;

provisioning the first plurality of links;

identifying a second plurality of links dedicated to a carrier virtual network accessible to the accessing telecommunication network that combine to meet service level requirements;

aggregating the first plurality of links at their termination;

aggregating the first plurality of links using a carrier virtual network manager; and

if one of the first plurality of links becomes impaired:

provisioning the second plurality of links;

aggregating the second plurality of links at their termination; and



aggregating the second plurality of links using a carrier virtual network manager.

23. The method for establishing an inverse multiplexed system of claim 22, wherein identifying a second plurality of links occurs only if one of the first plurality of links becomes impaired.

24. The method for establishing an inverse multiplexed system of claim 23, wherein the second plurality of links comprises the non-impaired links of the first plurality of links and at least one additional link.

25. At least one machine readable media containing machine readable code embodied thereon for causing a machine to perform a method for establishing a carrier virtual network inverse multiplexed connection to meet service level requirements, the method comprising:

establishing a first carrier virtual network that may be accessed by a first telecommunication network, establishing the first carrier virtual network comprising:

dedicating at least one portion of the layer one resources of at least one telecommunication network to the first carrier virtual network;

establishing a carrier virtual network manager to manage the at least one portion of the layer one resources dedicated to the carrier virtual network;

identifying the at least one portion of the layer one resources dedicated to the carrier virtual network to the carrier virtual network manager; and

accessing at least two layer one resources of the at least one portion of the layer one resources dedicated to the first carrier virtual network by at least one telecommunication network;

identifying a plurality of links in the first carrier virtual network that combine to meet service level requirements;

provisioning the plurality of links;

aggregating the identified plurality of links using the carrier virtual network manager; and

aggregating the identified links at their termination.

26. The at least one machine readable media of claim 25, the method further comprising:

identifying a plurality of alternative links for use if any of the identified links become impaired; and

aggregating at least one of the alternative links at the termination and the carrier virtual network manager if any of the identified links become impaired so that the aggregated links continue to meet the service level requirements.

27. The at least one machine readable media of claim 26, the method further comprising:

receiving an impairment alert at the carrier virtual network manager  
identifying the impairment of one of the aggregated links;

provisioning at least one alternative link to replace the impaired link;

re-aggregating the at least one alternative link with the non-impaired identified links at the termination; and

re-aggregating the at least one alternative link with the non-impaired identified links using the carrier virtual network manager.

28. The at least one machine readable media of claim 25, the method further comprising:

identifying a plurality of alternative links for use if any of the identified links become impaired;

receiving an impairment alert at the carrier virtual network manager identifying the impairment of one of the aggregated links;

provisioning at least one alternative link to replace the impaired link;

re-aggregating the at least one alternative link with the non-impaired identified links at the termination; and

re-aggregating the at least one alternative link with the non-impaired identified links using the carrier virtual network manager.

29. The at least one machine readable media of claim 25, the method further comprising:

receiving an impairment alert at the carrier virtual network manager identifying the impairment of one of the aggregated links;

identifying a second plurality of links in the first carrier network that combine to meet service level requirements, the second plurality of links not containing the impaired link;

provisioning the second plurality of links;

aggregating the second plurality of links using the carrier virtual network manager; and

aggregating the second plurality of links at the termination.

30. The at least one machine readable media of claim 29, the method further comprising identifying a second plurality of links before receiving an impairment alert.

31. The at least one machine readable media of claim 29, the method further comprising identifying a second plurality of links after receiving an impairment alert.

32. At least one machine readable media containing machine readable code embodied thereon for causing a machine to perform a method for establishing an inverse multiplexed connection to meet service level requirements using a plurality of links dedicated to at least one carrier virtual network accessible to an accessing telecommunication network, the method comprising:

identifying a first plurality of links dedicated to a carrier virtual network accessible to the accessing telecommunication network that combine to meet service level requirements;

provisioning the first plurality of links;

identifying a second plurality of links dedicated to a carrier virtual network accessible to the accessing telecommunication network that combine to meet service level requirements;

aggregating the first plurality of links at their termination;

aggregating the first plurality of links using a carrier virtual network manager; and

if one of the first plurality of links becomes impaired:

provisioning the second plurality of links;

aggregating the second plurality of links at their termination; and  
aggregating the second plurality of links using a carrier virtual network  
manager.

33. The at least one machine readable media of claim 32, the method further comprising identifying a second plurality of links only if one of the first plurality of links becomes impaired.

34. The at least one machine readable media of claim 33, wherein the second plurality of links comprises the non-impaired links of the first plurality of links and at least one additional link.